



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/755,673	01/05/2001	Leonard Forbes	MI22-1531	5293
21567	7590	08/16/2004	EXAMINER	
WELLS ST. JOHN P.S. 601 W. FIRST AVENUE, SUITE 1300 SPOKANE, WA 99201			NGUYEN, KHIEM D	
			ART UNIT	PAPER NUMBER
			2823	
DATE MAILED: 08/16/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/755,673

Applicant(s)

FORBES ET AL.

Examiner

Khiem D Nguyen

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 June 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4-26 and 35-44 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 35-44 is/are allowed.
- 6) ☒ Claim(s) 4-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 January 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 1st, 2004 has been entered. A new rejection is made as set forth in this Office Action. Claims (4-26 and 35-44) are pending in the application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi et al. (JP 2000058777) in view of Zhang (U.S. Patent 5,886,364), Chiu et al. (TW 381343) and Sun et al. (U.S. Patent 6,150,209).

In re claim 4, 6-8, 10, 11, 14, 16-19, 24 and 25, **Choi** discloses a method of forming a capacitor structure, comprising (See BASIC-ABSTRACT and **FIG. 8**): forming a first electrical node **102** comprises conductively doped silicon; forming a dielectric layers **115** comprising aluminum nitride over the first electrical node; forming a second electrical node **105** that is electrically separated from the first electrical node by at

least the dielectric material; the first electrical node, second electrical node and dielectric material together defining at least a portion of a capacitor structure.

Choi does not explicitly disclose that the dielectric layer is a layer of metallic aluminum that being entirely transformed into AlN, AlON or AlO wherein the listed compounds are described in terms of chemical constituents rather than stoichiometry.

Zhang, however, discloses that the dielectric layer is a layer of metallic aluminum 32 that being entirely transformed into aluminum nitride (AlN), aluminum oxynitride (AlON) or Aluminum oxide (AlO) wherein the listed compounds are described in terms of chemical constituents rather than stoichiometry (col. 5, lines 43-56 and **FIG. 3B**). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine the teaching of Choi and Zhang to enable the AlN, AlON or AlO layer of Choi to be formed and furthermore to provide a structure in which a device is protected from light entering from outside in order to reduce an loff currents of the device (col. 1, lines 39-43, Zhang).

In re claims 11, 19, 20, and 22, neither Choi nor Zhang discloses forming a layer of silicon dioxide between the first electrical node and the layer of metallic aluminum.

Chiu, however, discloses forming a silicon dioxide layer 20 between the first electrical node 18 and the dielectric layer 22 (BASIC-ABSTRACT and related FIG.). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine the teaching of Choi, Zhang and Chiu to enable the silicon dioxide layer of Choi to be formed and furthermore to prevent dielectric cracking of capacitors (BASIC-ABSTRACT). Chiu also discloses forming a second dielectric layer 26 on the

first dielectric layer. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine the teaching of Choi, Zhang and Chiu to enable the second AlON or AlO layer of Choi to be formed.

In re claims 5, 7, 9, 10, 12, 13, 15, 17, 18, 21, 23, and 25, neither Choi nor Zhang discloses the transforming temperature and the thickness ranges of the resulting layers of AlN, AlON, AlO and silicon dioxide. However, there is no evidence indicating that the transforming temperature and thickness ranges of the resulting layers of AlN, AlON, AlO and silicon dioxide are critical and it has been held that it is not inventive to discover the optimum or workable height of a result-effective variable within given prior art conditions by routine experimentation. See MPEP § 2144.05. Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising there from. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

In re claim 26, none of the references explicitly disclose providing a transistor adjacent the capacitor structure wherein the transistor and a capacitor structure together defining a DRAM cell comprising the transistor and the capacitor structure.

Sun, however, discloses providing a transistor adjacent the capacitor structure wherein the transistor and a capacitor structure together defining a DRAM cell comprising the transistor and the capacitor structure (**FIGS. 1-5** and related text). It would have been obvious to one of ordinary skill in the art at the time of the invention

was made to combine the teaching of Chiu, Choi, Zhang and Sun to enable a DRAM cell comprising the transistor and the capacitor structure of Choi to be formed and furthermore to reduce the leakage current (col. 2, lines 51-53, Sun).

Allowable Subject Matter

Claims 35-44 are allowed.

Reasons For Allowance

The following is a statement of reasons for the indication of allowable subject matter: The prior art taken alone or in combination neither discloses nor makes obvious the instant process of claims as a whole. Specifically, the prior art of record, Choi et al. (JP 2000058777) disclose a method of forming a capacitor structure, comprising (See BASIC-ABSTRACT and FIG. 8): forming a first electrical node 102 comprises conductively doped silicon; forming a dielectric layers 115 comprising aluminum nitride over the first electrical node; forming a second electrical node 105 that is electrically separated from the first electrical node by at least the dielectric material; the first electrical node, second electrical node and dielectric material together defining at least a portion of a capacitor structure and the secondary reference Zhang (U.S. Patent 5,886,364) discloses that the dielectric layer is a layer of metallic aluminum 32 that being entirely transformed into aluminum nitride (AlN), aluminum oxynitride (AlON) or Aluminum oxide (AlO) (col. 5, lines 43-56 and FIG. 3B) but fails to teach or suggest the Applicant's steps of exposing the layer of metallic aluminum to one or both of O or N at a temperature less than 300°C to form a dielectric material comprising aluminum and one or both of O and N as recited in the newly added independent claim 35, lines 6-8.

Response to Amendment and Arguments

In response to Applicants' argument that the Zhang reference does not teach or suggest a metallic aluminum layer that is entirely transformed into aluminum nitride, aluminum oxynitride or aluminum oxide, Examiner respectfully disagrees, while examiner concedes Zhang does not specify the forming of a capacitor or Choi a TFT, neither rules out the possibility of forming other device than the few Zhang and Choi teach. Indeed, one ordinarily skilled in the art would reasonably believe that many devices numbering thousands or even millions would be formed to complete a product. In microelectronic processing it is preferable to share as many common steps between devices to lower the production cost. Further, since Zhang discloses that the dielectric layer is a layer of metallic aluminum 32 that being entirely transformed into aluminum nitride (AlN), aluminum oxynitride (AlON) or Aluminum oxide (AlO) (col. 5, lines 43-56 and **FIG. 3B**) and the Choi reference teaches the formation of the AlN layer, but not the means, it is reasonable, that forming Choi's capacitor and with Zhang's TFT on the same substrate would use Zhang's process of forming AlN. For these reasons, examiner holds the rejection proper.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khiem D Nguyen whose telephone number is (571) 272-1865. The examiner can normally be reached on Monday-Friday (8:00 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (571) 272-1855. The fax phone numbers

Art Unit: 2823

for the organization where this application or proceeding is assigned are (703) 305-3432 for regular communications and (703) 305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

K.N.

August 12, 2004



**W. DAVID COLEMAN
PRIMARY EXAMINER**